

L2 ANSWER 1 OF 13 CAPLUS COPYRIGHT 2008 ACS on STN

ACCESSION NUMBER: 2008:739766 CAPLUS

TITLE: Electrocatalytic mechanism and kinetics of SOMs oxidation on ordered PtPb and PtBi intermetallic compounds: DEMS and FTIRS study

AUTHOR(S): Wang, Hongsen; Alden, Laif; DiSalvo, F. J.; Abruna, Hector D.

CORPORATE SOURCE: Department of Chemistry and Chemical Biology, Baker Laboratory, Cornell University, Ithaca, New York, 14853-1301, USA

SOURCE: Physical Chemistry Chemical Physics (2008), 10(25), 3739-3751

CODEN: PPCPFQ; ISSN: 1463-9076

PUBLISHER: Royal Society of Chemistry

DOCUMENT TYPE: Journal

LANGUAGE: English

AB The electrocatalytic activities and mechanisms of PtPb and PtBi ordered intermetallic phases towards formic acid, formaldehyde and methanol oxidation have been studied by DEMS and FTIRS, and the results compared to those for a pure polycryst. platinum electrode. While PtPb exhibits an enhanced electrocatalytic activity for the oxidation of all three organic mols. when compared to a Pt electrode, PtBi exhibits an enhanced catalytic activity towards formic acid and formaldehyde oxidation, but not methanol. FTIRS data indicate that adsorbed CO does not form on PtPb or PtBi intermetallic compds. during the oxidation of formic acid, formaldehyde and methanol, and therefore their oxidation on both PtPb and PtBi intermetallic compds. proceeds via a non-COads pathway. Quant. DEMS measurements indicate that only CO<sub>2</sub> was detected as a final product during formic acid oxidation on Pt, PtPb and PtBi electrodes. At a smooth polycryst. platinum electrode, the oxidation of formaldehyde and methanol produces mainly intermediates (formaldehyde and formic acid), while CO<sub>2</sub> is a minor product. In contrast, CO<sub>2</sub> is the major product for formaldehyde and methanol oxidation at a PtPb electrode. The high current efficiency of CO<sub>2</sub> formation for methanol and formaldehyde oxidation at a PtPb electrode can be ascribed to the complete dehydrogenation of formaldehyde and formic acid due to electronic effects. The low onset potential, high c.d. and high CO<sub>2</sub> yield make PtPb one of the most promising electrocatalysts for fuel cell applications using small organic mols. as fuels.

L2 ANSWER 2 OF 13 CAPLUS COPYRIGHT 2008 ACS on STN

ACCESSION NUMBER: 2008:532602 CAPLUS

DOCUMENT NUMBER: 149:40708

TITLE: Electrocatalytic Properties of PtBi and PtPb Intermetallic Line Compounds via DFT: CO and H adsorption

AUTHOR(S): Wang, L.-L.; Johnson, D. D.

CORPORATE SOURCE: Department of Materials Science and Engineering and Frederick Seitz Materials Research Laboratory, University of Illinois, Urbana, IL, 61801, USA

SOURCE: Journal of Physical Chemistry C (2008), 112(22), 8266-8275

CODEN: JPCCKK; ISSN: 1932-7447

PUBLISHER: American Chemical Society

DOCUMENT TYPE: Journal

LANGUAGE: English

AB Pt intermetallic line compds., such as with Pb and Bi, improve dramatically the anode CO tolerance of fuel cells for oxidation of small organic mols. D. functional theory was used to study the CO and H adsorption on different surfaces of these line compds. Among different surface orientations of PtPb and PtBi, we find (100)B and (110) have much lower cleavage energies and CO adsorption energies than (100)A and (001) and also much lower CO adsorption energies than

Pt(111). Thus, (100)B and (110) are the surfaces most relevant to exptl. observations, and the increased CO tolerance is not attributable to the (001) surface of the line compds. as assumed exptl., because it binds CO the strongest, even more strongly than Pt(111). Also CO is not likely to dissociate on these materials. Finally, the authors correlate d-band center and CO adsorption energy for these non close-packed systems by developing a more universal form of the original d-band center model that includes effects of symmetry of adsorption site and local relaxation. The increased CO tolerance arises from a downward shift of Pt d-band center because of alloying, which also accounts for the difference between PtPb and PtBi.

REFERENCE COUNT: 32 THERE ARE 32 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L2 ANSWER 3 OF 13 CAPLUS COPYRIGHT 2008 ACS on STN

ACCESSION NUMBER: 2008:113463 CAPLUS

DOCUMENT NUMBER: 148:365463

TITLE: Electrocatalytic Activity of Ordered Intermetallic PtPb Nanoparticles Prepared by Borohydride Reduction toward Formic Acid Oxidation

AUTHOR(S): Matsumoto, Futoshi; Roychowdhury, Chandrani; DiSalvo, Francis J.; Abruna, Hector D.

CORPORATE SOURCE: Department of Chemistry and Chemical Biology, Cornell University, Ithaca, NY, 14853-1301, USA

SOURCE: Journal of the Electrochemical Society (2008), 155(2), B148-B154

CODEN: JESQAN; ISSN: 0013-4651

PUBLISHER: Electrochemical Society

DOCUMENT TYPE: Journal

LANGUAGE: English

AB The electrocatalytic activity of nanoparticles of the ordered intermetallic compound PtPb toward the oxidation of formic acid (FA) for potential fuel cell applications was studied using cyclic voltammetry, rotating disk electrode voltammetry, and chronoamperometry. The PtPb nanoparticles were prepared by dissolving Pt and Pb precursors in anhydrous MeOH, and reducing with NaBH<sub>4</sub>. When the activity of PtPb nanoparticles was compared to that of com. available Pt, Pd, and Pt-Ru/Vulcan alloy nanoparticles for the oxidation of FA, the PtPb nanoparticles exhibited superior electrocatalytic activity in terms of oxidation onset potential (-0.18 V vs. Ag/AgCl) and mass activity (0.13 mA μg<sup>-1</sup> at +0.2 V) in 0.5M FA and 0.1M H<sub>2</sub>SO<sub>4</sub> solution. The PtPb nanoparticles exhibited larger heterogeneous charge-transfer rate consts. and significantly enhanced tolerance to poisoning by CO and S-containing compds. At low applied potential (E = 0.0 V), a stable oxidation current for FA oxidation could be observed for 9 h, compared to a large decrease in oxidation current, ostensibly due to CO poisoning, on Pt, Pd, and Pt-Ru/Vulcan alloy nanoparticles.

REFERENCE COUNT: 48 THERE ARE 48 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L2 ANSWER 4 OF 13 CAPLUS COPYRIGHT 2008 ACS on STN

ACCESSION NUMBER: 2007:1314559 CAPLUS

TITLE: A high-throughput search for direct methanol fuel cell anode electrocatalysts of type Pt<sub>x</sub>Bi<sub>y</sub>Pb<sub>z</sub>

AUTHOR(S): Jin, Jing; Prochaska, Mark; Rochefort, Dominic; Kim, David K.; Zhuang, Lin; DiSalvo, Francis J.; van Dover, R. B.; Abruna, Hector D.

CORPORATE SOURCE: Department of Chemistry and Chemical Biology, Cornell University, Ithaca, NY, 14853, USA

SOURCE: Applied Surface Science (2007), 254(3), 653-661

CODEN: ASUSEE; ISSN: 0169-4332

PUBLISHER: Elsevier B.V.

DOCUMENT TYPE: Journal

LANGUAGE: English

AB We used a high-throughput method to screen for direct methanol fuel cell anode electrocatalysts in the Pt-Bi-Pb system. Previous studies showed that PtBi and PtPb (both NiAs structure type) were active electrocatalysts for the oxidation of formic acid, but only PtPb was active in oxidizing methanol. We synthesized thin films with continuous composition spreads of the three elements by magnetron sputtering at deposition temps. from ambient to 510 °C. A fluorescence method was then used to identify comps. that were active toward methanol oxidation. Only films deposited between temps. of 160 and 400 °C showed electrocatalytic activity. The areas that were active for methanol oxidation showed predominantly the NiAs structure type according to XRD, with optimal activity for comps. near PtBi<sub>0.01</sub>Pb<sub>0.53</sub>.

REFERENCE COUNT: 24 THERE ARE 24 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L2 ANSWER 5 OF 13 CAPLUS COPYRIGHT 2008 ACS on STN

ACCESSION NUMBER: 2007:1233192 CAPLUS

DOCUMENT NUMBER: 148:106834

TITLE: Electronic Effects in CO Chemisorption on Pt-Pb Intermetallic Surfaces: A Theoretical Study

AUTHOR(S): Ranjan, Chinmoy; Hoffmann, Rold; DiSalvo, Francis J.; Abruna, Hector D.

CORPORATE SOURCE: Department of Chemistry and Chemical Biology, Cornell University, Ithaca, NY, 14853, USA

SOURCE: Journal of Physical Chemistry C (2007), 111(46), 17357-17369

CODEN: JPCCKC; ISSN: 1932-7447

PUBLISHER: American Chemical Society

DOCUMENT TYPE: Journal

LANGUAGE: English

AB The chemisorption of CO on surfaces of Pt-Pb intermetallic comps., found to be useful as fuel cell electrocatalysts, was analyzed theor. Specifically, d.-functional theory and extended Hueckel-based calcs. on CO adsorption on Pt(111), Pt<sub>3</sub>Pb(111), and PtPb(0001) surfaces are reported. Binding energies on Pt<sub>3</sub>Pb(111) are computed to be generally smaller than binding energies on Pt(111). The binding energies at the 2- and 3-fold sites on Pt<sub>3</sub>Pb(111) increase if there is a Pb atom underneath the site in the second surface layer. The binding energies on PtPb(0001) are much higher than those on the other surfaces. These trends have been analyzed with crystal overlap Hamilton population (COHP)-based energy partitioning. The most stabilizing interaction in chemisorption is the Pt-adsorbate bond formation; the surface and the adsorbate are internally destabilized. The major surface effects are pretty much restricted to the top two layers. The binding energy trend for the top site chemisorption follows the Pt-adsorbate interaction term (most stabilizing interaction term in chemisorption). This surface Pt-adsorbate interaction term, for top site chemisorption, has been analyzed further with a Frontier MO formalism based on the extended Hueckel calcs. Electron donation from Pb atoms to Pt atoms plays an important role in distinguishing chemisorption on these surfaces. The higher Fermi energy of the Pt-Pb intermetallic surfaces, relative to Pt(111) surface, leads to a weaker Pt-adsorbate interaction, which correlates well with the lower binding energy on Pt-Pb intermetallic surfaces when compared to Pt(111). The variation of the binding energy within the 2- and 3-fold sites on Pt<sub>3</sub>Pb(111) cannot be explained by the Pt-adsorbate interaction term alone. From a detailed COHP anal. of the surface and adsorbate, we find that the adsorption site affects the electron movements (transfer of electrons) in the surface slab upon chemisorption and through them the overall binding energy of the adsorbate. The difference in binding energies between the Pt<sub>3</sub>Pb(111) hcp and fcc sites can be explained this way.

REFERENCE COUNT: 28 THERE ARE 28 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L2 ANSWER 6 OF 13 CAPLUS COPYRIGHT 2008 ACS on STN

ACCESSION NUMBER: 2007:880730 CAPLUS

TITLE: Electrocatalytic property of PtPb and PtBi  
intermetallic line compounds via DFT

AUTHOR(S): Wang, Lin-lin; Johnson, Duane D.

CORPORATE SOURCE: Department of Materials Science and Engineering,  
University of Illinois at Urbana-Champaign, Urbana,  
IL, 61801, USA

SOURCE: Abstracts of Papers, 234th ACS National Meeting,  
Boston, MA, United States, August 19-23, 2007 (2007),  
COLL-410. American Chemical Society: Washington, D.  
C.

CODEN: 69JNR2

DOCUMENT TYPE: Conference; Meeting Abstract; (computer optical disk)

LANGUAGE: English

AB Pt intermetallic line compds., such as with Pb and Bi, have been observed to improve dramatically the anode CO-tolerance of fuel cells for oxidation of small organic mols. However, a major problem in these materials is the leaching of the p-metals, but Pb is observed to be more resistive against leaching than Bi when alloyed with Pt. We have used d. functional theory (DFT) to study the adsorptions of CO and water activation to form OH and O on different surfaces of these compds. We find that the increased CO-tolerance arises from a downward shift of Pt d-band center due to alloying, and that the oxidation of metallic sites via water activation is very different on PtPb and PtBi surfaces; namely, Bi sites are preferably oxidized over Pt, whereas Pt sites are preferred over majority of Pb sites, thereby protecting them against oxidation. From a calcn. of the reaction free energy vs. electrode potential, we argue that the distinctly different oxidation site preference leads to the observed difference in leaching behaviors of PtPb and PtBi. Funding is from DOE Catalysis (DE-FG02-03ER15476) and the Frederick Seitz Materials Research Laboratory at UIUC (DEFG02-91ER45439), and computing support is from the Materials Computation Center (NSF DMR-0325939).

L2 ANSWER 7 OF 13 CAPLUS COPYRIGHT 2008 ACS on STN

ACCESSION NUMBER: 2007:294759 CAPLUS

TITLE: Intermetallic nanoparticles for fuel  
cell applications: Synthesis and  
characterization studies

AUTHOR(S): Roychowdhury, Chandrani; DiSalvo, F. J.

CORPORATE SOURCE: Chemistry and Chemical Biology, Cornell University,  
Ithaca, NY, 14850, USA

SOURCE: Abstracts of Papers, 233rd ACS National Meeting,  
Chicago, IL, United States, March 25-29, 2007 (2007),  
INOR-630. American Chemical Society: Washington, D.  
C.

CODEN: 69JAUJ

DOCUMENT TYPE: Conference; Meeting Abstract; (computer optical disk)

LANGUAGE: English

AB Pt-based alloys, like Pt-Ru have been used as anode catalysts in direct type fuel cells for a long time. Pt-Ru remains the research and industry standard in PEMFCs. However, PtRu suffers from a significant overpotential for the oxidation of organic fuels and from sulfur poisoning and these result in loss of anode efficiency. Furthermore, as with all alloys, PtRu has an inherently poorly defined surface structure, with its surface sites occupied by Pt or Ru in a random fashion. Recent investigations of low temperature fuel cell electrocatalysts show that ordered intermetallic compds. such as PtBi and PtPb have lower oxidation onset potentials and higher current densities than Pt, especially for formic acid oxidation. While searching for even better catalyst materials among the large family of intermetallics is important and ongoing, it is also essential that nano-particles of these materials be prepared. We present here our results from many novel synthetic techniques

that have successfully achieved this goal to make intermetallic nanoparticles. PtBi and PtPb have been synthesized by using methanol as the solvent and NaBH<sub>4</sub> as the reducing agent. UHV-STEM analyses verify the presence of aggregated nanocrystals of PtPb and PtBi. PtPb nanoparticles supported on carbon have also been synthesized by chemical co-reduction of novel metal precursors in the presence

of

Vulcan, in order to obtain enhanced surface area and prevent particle aggregation. Results from the characterization studies of these supported nanoparticles using pXRD, SEM, UHV-STEM, EDX, electron diffraction and BET surface area measurements, as well as electrocatalytic activity for the oxidation of formic acid and methanol, will be presented.

L2 ANSWER 8 OF 13 CAPLUS COPYRIGHT 2008 ACS on STN

ACCESSION NUMBER: 2006:1220894 CAPLUS

DOCUMENT NUMBER: 146:430290

TITLE: Bimetallic PtPb for formic acid electro-oxidation

AUTHOR(S): Zhang, L. J.; Wang, Z. Y.; Xia, D. G.

CORPORATE SOURCE: College of Environmental and Energy Engineering, Beijing University of Technology, Beijing, 100022, Peop. Rep. China

SOURCE: Journal of Alloys and Compounds (2006), 426(1-2), 268-271

CODEN: JALCEU; ISSN: 0925-8388

PUBLISHER: Elsevier B.V.

DOCUMENT TYPE: Journal

LANGUAGE: English

AB Bimetallic PtPb had been synthesized by arc-melted and then sintering treatment. The electrooxidn. of formic acid on PtPb was studied at room temperature by cyclic voltammetry and chronoamperometry. The results are compared to those at a polycryst. Pt electrode surface. PtPb Bimetallic was catalytically more active than pure Pt. Firstly, at the PtPb surface the peak potential for formic acid oxidation is shifted neg. by over 300 mV. Secondly, the c.d. at the PtPb electrode is dramatically higher than that for the Pt electrode. Thirdly, the ratio of the forward anodic peak c.d. (If) to the reverse anodic peak c.d. (Ib) for PtPb was much higher than that for the Pt electrode which indicated more intermediate carbonaceous species were oxidized to CO<sub>2</sub> in the forward scan on PtPb electrode surface. XRD and XPS technologies had been used to study the crystal structure and electron effect. Probably formic acid decomposition on PtPb favors the reactive intermediate route and is not very much affected by the CO intermediate as compared to Pt.

REFERENCE COUNT: 12 THERE ARE 12 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L2 ANSWER 9 OF 13 CAPLUS COPYRIGHT 2008 ACS on STN

ACCESSION NUMBER: 2006:621869 CAPLUS

DOCUMENT NUMBER: 145:110978

TITLE: Surface composition of ordered intermetallic compounds PtBi and PtPb

AUTHOR(S): Blasini, D. R.; Rochefort, D.; Fachini, E.; Alden, L. R.; DiSalvo, F. J.; Cabrera, C. R.; Abruna, H. D.

CORPORATE SOURCE: Chemistry and Chemical Biology Department, Baker Laboratory, Cornell University, Ithaca, NY, 14853-1301, USA

SOURCE: Surface Science (2006), 600(13), 2670-2680

CODEN: SUSCAS; ISSN: 0039-6028

PUBLISHER: Elsevier B.V.

DOCUMENT TYPE: Journal

LANGUAGE: English

AB The surface composition of bulk electrodes made from the ordered intermetallic phases PtBi and PtPb was studied by ex-situ XPS after being

subjected to various electrochem. treatments. Anal. of the freshly polished surfaces showed that in the surface and near surface regions the less-noble metals; Bi and Pb are oxidized to a significant extent (28% and 41%, resp.). Upon cycling to increasingly pos. potentials, the fraction of oxidized to metallic forms of Bi and Pb decreased gradually to reach the minimal values of 7% and 6% at +400 mV vs. Ag/AgCl (saturated KCl). The observed decrements are due to leaching of surface oxides; Bi<sub>2</sub>O<sub>3</sub> on PtBi and PbCO<sub>3</sub> or Pb(OH)<sub>2</sub> on PtPb. When the potential sweep was extended to more pos. values, there was a linear decrease in the surface concentration

of

the less-noble metal, along with a slight increase in the amount of the species in their oxidized state (Bi<sub>2</sub>O<sub>3</sub> for PtBi and PbSO<sub>4</sub> for PtPb). Leaching of Bi from the electrode surface occurs in accordance to the Pourbaix diagram for elemental Bi, indicating no significant increase in stability arising from the formation of an intermetallic phase with platinum. In the case of PtPb, however, the Pb starts to dissolve away at potentials significantly more pos. (+800 mV) than what was anticipated from the Pourbaix diagram. The results obtained here are in accord with our previous observations on the effects of electrochem. pretreatment on these intermetallic phases for the electrocatalytic oxidation of formic acid and other potential fuel cell fuels.

REFERENCE COUNT: 37 THERE ARE 37 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L2 ANSWER 10 OF 13 CAPLUS COPYRIGHT 2008 ACS on STN

ACCESSION NUMBER: 2006:562658 CAPLUS

DOCUMENT NUMBER: 145:233007

TITLE: High throughput screening of electrocatalysts for fuel cell applications

AUTHOR(S): Prochaska, Mark; Jin, Jing; Rochefort, Dominic; Zhuang, Lin; DiSalvo, Francis J.; Abruna, Hector D.; van Dover, R. B.

CORPORATE SOURCE: Department of Applied and Engineering Physics, Cornell Fuel Cell Institute, Cornell University, Ithaca, NY, 14853, USA

SOURCE: Review of Scientific Instruments (2006), 77(5), 054104/1-054104/8

CODEN: RSINAK; ISSN: 0034-6748

PUBLISHER: American Institute of Physics

DOCUMENT TYPE: Journal

LANGUAGE: English

AB The generation and screening of combinatorial libraries of electrocatalysts for fuel cells, generated by co-sputtering of 3 elements onto a Si substrate, coated with a Ta adhesion underlayer, are presented. Screening was carried out via fluorescence assay and by SEM. Whereas the former provided rapid qual. screening with limited spatial resolution, the latter provided high spatial resolution. The fluorescence screening method was tested on Pt, PtBi, PtPb, and PtRu nanoparticles, while both methods were tested on a film containing a Pt-Bi-Pb ternary composition spread.

REFERENCE COUNT: 35 THERE ARE 35 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L2 ANSWER 11 OF 13 CAPLUS COPYRIGHT 2008 ACS on STN

ACCESSION NUMBER: 2006:550185 CAPLUS

DOCUMENT NUMBER: 145:197567

TITLE: Synthesis, Characterization, and Electrocatalytic Activity of PtBi and PtPb Nanoparticles

Prepared by Borohydride Reduction in Methanol  
AUTHOR(S): Roychowdhury, Chandrani; Matsumoto, Futoshi; Zeldovich, Varvara B.; Warren, Scott C.; Mutolo, Paul F.; Ballesteros, MariaJulieth; Wiesner, Ulrich; Abruna, Hector D.; DiSalvo, Francis J.

CORPORATE SOURCE: Department of Chemistry and Chemical Biology, Baker

SOURCE: Laboratory, Cornell University, Ithaca, NY, 14853, USA  
Chemistry of Materials (2006), 18(14), 3365-3372  
CODEN: CMATEX; ISSN: 0897-4756  
PUBLISHER: American Chemical Society  
DOCUMENT TYPE: Journal  
LANGUAGE: English

AB Intermetallic compds. PtPb and PtBi were prepared in nanoparticle form by dissolving Pt and Pb or Bi precursors in anhydrous MeOH and coreducing the metal precursors with Na borohydride. The average domain size determined from pXRD (powder x-ray diffraction) is 10 nm. The particles were characterized by pXRD, SEM, STEM, EDX, and CBED. SEM and STEM images show the particles to be aggregated, forming clusters and chains. The BET surface area of the nanoparticles was measured using Kr as the adsorbing gas. The electrocatalytic oxidation of formic acid and MeOH by the as-prepared PtPb and PtBi nanoparticles was studied by rotating disk voltammetry for potential fuel-cell applications. The PtPb and PtBi nanoparticles displayed enhanced electrochem. activity toward formic acid and MeOH oxidation when compared to com. available Pt and PtRu nanoparticles. The electrocatalytic activity of the PtPb nanoparticles was studied as a function of sonication time of the catalyst ink, and morphol. changes were followed by SEM. The activity of the catalyst initially increased with sonication time and then decreased.

REFERENCE COUNT: 41 THERE ARE 41 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L2 ANSWER 12 OF 13 CAPLUS COPYRIGHT 2008 ACS on STN

ACCESSION NUMBER: 2004:586025 CAPLUS

DOCUMENT NUMBER: 141:263324

TITLE: Surface treatment effects on the electrocatalytic activity and characterization of intermetallic phases  
AUTHOR(S): Volpe, D.; Casado-Rivera, E.; Alden, L.; Lind, C.; Hagerdon, K.; Downie, C.; Korzeniewski, C.; DiSalvo, F. J.; Abruna, H. D.

CORPORATE SOURCE: Department of Chemistry and Chemical Biology, Baker Laboratory, Cornell University, Ithaca, NY, 14853-1301, USA

SOURCE: Journal of the Electrochemical Society (2004), 151(7), A971-A977

CODEN: JESQAN; ISSN: 0013-4651

PUBLISHER: Electrochemical Society

DOCUMENT TYPE: Journal

LANGUAGE: English

AB Ordered intermetallic phases of PtBi and PtPb were prepared and studied with cyclic voltammetry, rotating disk electrode voltammetry, and FTIR, as potential fuel cell electrocatalysts, using formic acid as a model system. Their electrochem. activity, reaction kinetics, and resistance to CO surface poisoning were determined. Both types of electrode displayed activity superior to that of pure Pt under all conditions tested, but their surfaces roughen at pos. potentials (>+400 mV vs. Ag/AgCl) in acidic media due to preferential dissoln. of the Bi and Pb. Each electrode was subjected to a variety of surface treatment to identify suitable cleaning methods. Mech. polishing with alumina is the best treatment for PtBi, while PtPb was insensitive to treatment procedures and parameters. Using the rotating disk electrode method, a value of  $1.4 \times 10^{-4}$  cm/s was obtained for the heterogeneous charge-transfer rate constant for PtPb in formic acid. Both PtBi and PtPb exhibited high tolerance to CO poisoning - no evidence of CO adsorption at any potential was found with FTIR.

REFERENCE COUNT: 34 THERE ARE 34 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L2 ANSWER 13 OF 13 CAPLUS COPYRIGHT 2008 ACS on STN

ACCESSION NUMBER: 2004:183382 CAPLUS

